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THE RELATIONSHIP BETWEEN DOGMATISM AND PERFORMANCE AS MEASURES OF PROBLEM-SOLVING ABILITY AMONG PROFESSIONAL ADULT EDUCATORS (COUNTY EXTENSION AGENTS). PAPER PRESENTED AT THE NATIONAL SEMINAR ON ADULT EDUCATION RESEARCH (CHICAGO, 1968).

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TO DETERMINE THE RELATIONSHIP BETWEEN DOGMATISM AND PERFORMANCE AS MEASURES OF PROBLEM SOLVING ABILITY IN EXTENSION AGENTS, A STUDY WAS MADE OF 486 AGENTS AND 23 SUPERVISORS IN FIVE STATES. AGENTS RESPONDED TO MAILED QUESTIONNAIRES AND THEIR SUPERVISORS RETURNED PERFORMANCE RATINGS. THE DEGREE OF OPEN-MINDEDNESS WAS MEASURED ON THE ROKEACH DOGMATISM SCALE AND PERFORMANCE SCORES WERE MEASURED BY RATINGS BY THE SUPERVISORS USING THE LAWSHE KEPHART PERSONNEL COMPARISON SYSTEM. AN INVERSE RELATIONSHIP BETWEEN LEVEL OF DOGMATISM AND PERFORMANCE WAS INDICATED. IT WAS MOST STRONGLY ASSOCIATED WITH MIDDLE AGED AGENTS, AND THOSE WITH LESS THAN A MASTER'S DEGREE. A SLIGHT POSITIVE RELATIONSHIP WAS SHOWN BETWEEN AGE AND DOGMATISM, AND A STRONG NEGATIVE ASSOCIATION BETWEEN LEVEL OF EDUCATION AND DOGMATISM. ANALYSIS ALSO SUGGESTED THAT AGENTS LOW IN DOGMATISM WERE RATED HIGHER IN PERFORMANCE THAN AGENTS HIGH IN DOGMATISM REGARDLESS OF THE DEGREE OF DOGMATISM OF THE SUPERVISOR. THIS PAPER WAS PRESENTED AT THE NATIONAL SEMINAR ON ADULT EDUCATION RESEARCH, CHICAGO, FEBRUARY 11-13, 1968. (RT)

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THE RELATIONSHIP BETWEEN DOGMATISM AND PERFORMANCE AS MEASURES OF PROBLEM-SOLVING ABILITY AMONG PROFESSIONAL ADULT EDUCATORS (COUNTY EXTENSION AGENTS)

By

C. Dennis Funk and G. L. Carter, Jr.*

The purpose of this study was to determine the relationship between dogmatism and performance as measures of problem solving ability in Extension agents (professional adult educators). Dogmatism, as used in the study, has reference to the total open/closed mindedness continuum. The extremes on the continuum are represented by open-mindedness (low dogmatism) and closed-mindedness (high dogmatism). Performance has reference to total job performance rather than performance on specific job tasks.

Theoretical Orientation

The schema shown in Figure 1 was developed to assist in conceptualizing the orientation of the study. The focal point is the triangle (encompassing problem solving, decision making and reflective thinking). The balance of the schema illustrates how administrative and personality theory converge upon and influence the forms of human behavior depicted by the triangle.

Most human behavior is problem oriented. Thinking does not

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occur in a vacuum; it always involves a problem. According to Klausmeier and Goodwin, "problem solving is the most complex form of human behavior. One must think in order to solve problems."[1] They say that problem solving is at the apex of human learning.[2]

The steps involved in problem solving as outlined by Klausmeier and Goodwin[3] are basically the same as those given by Dewey[4] for reflective thinking and by Newman[5] for decision making. In essence, problem solving, reflective thinking and decision making are similar concepts and are at the heart of human behavior. Throughout the remainder of this paper, problem solving has reference to the total triangle in the schema, including reflective thinking and decision making.

The ability of an individual to solve problems is reflected in his performance. This is especially evident in the field of education. The performance of students, teachers and administrators is directly related to their ability to solve problems or make decisions.

The question then arises: What factors are associated with efficient and effective problem solving and how can they be measured? This study looked to administrative and personality theory for clues to an answer.

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[1] Herbert J. Klausmeier and William Goodwin, Learning and Human Abilities, Second Ed. (New York: Harper and Row, Publishers, 1966) p. 257.

[2] Ibid. p. 262.

[3] Ibid. p. 264.

[4] John Dewey, How We Think (Boston: D.C. Heath and Company, 1933).

[5] William H. Newman, Administrative Action, Second Ed. (Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1964).

Administrative Theory

Several functional theories of administration have been advanced in recent years. Among them are the anxiety theory, fusion theory, social process theory and decision making theory. The latter is most relevant to this study.

Decision making theory recognizes that people are constantly being placed in problem solving situations and are capable of solving problems. Further, it advocates decentralizing decisions and involving people throughout an organization in making decisions. The role of the administrator is to regulate the decision making process rather than making terminal decisions. Therefore, this theory encourages the practice of problem solving at all levels in an organization.

To be an effective administrator certain skills are required.[1/] The skills bearing most directly upon problem solving are conceptual skills or the ability to conceptualize the whole entity or problem, as well as the parts in relation to the whole. The extent to which these skills are manifest in effective problem solving is reflected in performance. In other words, performance is a measure of problem solving ability, which is influenced by the conceptual skills one possesses.

How are administrative skills--particularly conceptual skills--acquired? Personality theory provides clues. Conceptual skills are associated with conceptual development and include the cognitive tools with which a person can evaluate a problem, identify alternative solutions, anticipate the consequences of alternatives, and make a decision

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[1/] Robert L. Katz, "Skills of an Effective Administrator," Harvard Business Review, XXXIII (January-February, 1955).

or arrive at a solution to the problem.

Personality Theory

Harvey, Hunt and Schroder[1] suggest that every individual has a conceptual system which can be located on a continuum ranging from underdeveloped to highly developed. Education, training and experience encourage the movement of one's conceptual system from the underdeveloped toward the highly developed. However, the movement across the continuum is not the same for all individuals even though they may have equivalent education, training and experience. Those who move less rapidly away from or remain on the underdeveloped end of the continuum are similar in characteristics to the closed-minded (as identified by Rokeach). Those who move more rapidly toward the highly developed end of the continuum are similar to those identified as open-minded.

Rokeach[2] discusses the open/closed minded tendency in terms of a belief/disbelief system. He theorizes that each individual's belief/disbelief system can be located on a continuum ranging from closed-minded to open-minded. The basic characteristics defining the extent to which a person is open or closed-minded, according to Rokeach, is the extent to which the person can receive, evaluate, and act on relevant information received from the outside on its own intrinsic merits, unencumbered by irrelevant factors in the situation arising from within

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[1] O.J. Harvey, David E. Hunt and Harold M. Schroder, Conceptual Systems and Personality Organization (New York:John Wiley and Sons, Inc., 1961).

[2] Milton Rokeach, The Open and Closed Mind (New York:Basic Books, Inc., 1960).

the person or from the outside.[1] In other words, open/closed mindedness is a general personality trait which is related to the ability to form new cognitive systems of various kinds--perceptual, conceptual, aesthetic.[2] Open-mindedness is characterized by the ability to integrate and synthesize information into new cognitive systems, thus enhancing conceptual development. Closed-mindedness, on the other hand, is the lack of this ability and consequently limits conceptual development.

Open/closed mindedness is not related to intelligence. To say that a person is open-minded does not imply that he is more nor less intelligent than one who is closed-minded.

> In two separate studies, scores on the Dogmatism Scale were found to correlate only .02 and -.01 with intelligence as measured by standard group tests. These zero correlations strongly suggest that open-mindedness and intelligence represent quite different aspects of an individual's personality.[3]

According to personality theory, then, there are some general traits which enhance conceptual development (open-mindedness) and others which limit or may even inhibit conceptual development (closed-mindedness).

The final questions giving rise to the study were: Can open/closed mindedness (dogmatism) as a factor influencing conceptual development be used to measure problem solving ability (performance)? What

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[1] Ibid. p. 57.

[2] David Krech, Richard S. Crutchfield and Egerton L. Ballachey, Individual in Society (New York:McGraw-Hill Book Company, Inc., 1962).

[3] Krech et al., op. cit. p. 48.

is the relationship between problem solving ability as measured by open/closed mindedness and problem solving ability as measured by supervisor's rating of performance?

Measurement of the Variables

Dogmatism

The degree of openness or closedness of the belief/disbelief system was measured by the Rokeach Dogmatism Scale (Form E). This scale consists of 40 statements, each "designed to transcend specific ideological positions in order to penetrate to the formal and structural characteristics of all positions."[1/] Rokeach reports a reliability of from .68 to .93 on ten different studies using the Form E. He says, "These reliabilities are considered to be quite satisfactory, especially when we remember that the Dogmatism Scale contains quite a strange collection of items that cover a lot of territory and appear on the surface to be unrelated to each other."[2/]

There are six possible responses for each of the 40 items on the scale. The responses and their scale values are:

I agree	or	I disagree
+3 very much		-3 very much
+2 on the whole		-2 on the whole
+1 a little		-1 a little

To eliminate the plus and minus signs for scoring purposes a positive 4 is added to each response value, Therefore, for scoring

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[1/] Rokeach, op. cit., p. 72.

[2/] Rokeach, op. cit., p. 90.

purposes the responses acquire the following values:

I agree	or	I disagree
7 very much		1 very much
6 on the whole		2 on the whole
5 a little		3 a little

A disagree response indicates open-mindedness, an agree response indicates closed-mindedness. Likewise, a low score indicates low dogmatism or open-mindedness, a high score, high dogmatism or closed-mindedness. The range of scores possible from the Form E Scale is 40-280.

Performance

A performance score was determined by a supervisor's rating using the Lawshe-Kephart Personnel Comparison System.[1/] This is a paired comparison technique. By this technique the supervisor was ask to rate the performance of each agent with each other agent. They respond to the question: "Which of these two agents is doing his job better?"

Performance scores are determined by the frequency with which one agent is rated over another. It is also influenced by the number of employees paired. Regardless of the number compared, the high performer is always scored 75 and the low is scored 25--others are distributed between these extremes. A table is provided for determining the performance score based upon the number of employees paired.[2/]

[1/] C.H. Lawshe and N.C. Kephart, "Manual For Use With the Lawshe-Kephart Personnel Comparison System," Occupational Research Center, Purdue University, (July, 1963).

[2/] Ibid. p. 15.

The number of pairs increase geometrically as the number of employees to be paired increases. For example, 24 employees paired will require 276 pairings; 25 employees requires 300 pairings. Because of the time involved in preparing the booklets and making the comparisons, 25 employees (300 pairings) are about the maximum recommended number (the table for determining the performance rating index goes up to 300 pairings).

In the study being reported, total pairing was done for 20 districts. One district included 26 agents. Three districts exceeded 26 agents; consequently modifications of the paired comparison techniques were required. When the group being compared is too large a partial pairing technique can be used. This requires that a grid or matrix be developed to insure that each person is paired with the same number of others.

McCormick and Bachus[1/] found that groups of 50 could be paired with as few as 25 others and still have a .96 correlation with total pairing. They paired groups of 30 with only 15 others (one-half of the group) and still had a .979 and .991 correlation with total pairing in two separate groups.

Troyer[2/] compared total paired comparisons with partial pairing

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[1/] Ernest J. McCormick and John A. Bachus, "Paired Comparison Ratings. I. The Effect of Ratings of Reductions in the Number of Pairs," Journal of Applied Psychology, XXXVI (April, 1952), pp. 123-127.

[2/] Donald Robert Troyer, "An Analysis of the Paired Comparison Rating Technique for Promotions, Transfers and Salary Increases of Agricultural Extension Workers of Indiana" (unpublished M.S. thesis, University of Wisconsin, Madison, 1960).

in rating Extension agent performance. Partial pairing with 50 percent of the agents in a district (in 9 districts ranging from 12 to 25 agents) produced correlations between total and partial pairings ranging from .77 to .97.

Based on this evidence, partial pairing was done with two districts in this study. Twenty-nine agents in one district were partially paired with 20 others. In another district of 27 agents, each agent was paired with 22 others.

One district contained 37 agents. In this case, agents were randomly divided into two groups of 18 and 19 and treated as two separate districts. This procedure is also supported by McCormick and Bachus. They randomly split two groups of 50 into 25 each. Total pairing was done on each group of 25 and then correlated with the results of total pairing of the original 50 (correlations: .974 and .955).

The Study Population

The study involved 23 supervisors and 503 agents from five states. The supervisors were included to provide a performance rating on agents and as a part of the congruency aspect of the study to be explained later on. However, the agent is the unit of analysis.

The 503 agents included all agents in the 23 supervisory districts having major responsibility for adult agricultural and related programs, and who began working in Extension prior to July 1, 1966. States were selected on the basis of their supervisor/agent ratio and willingness of the State Extension Administration to cooperate. Included were two states from the Southern and Western regions and one from the Northcentral. The states were not intended to be a random

sample, nor was an attempt made to insure representativeness. Therefore, the respondents in the study are considered a unique population.

Data Collection

Data were collected by mail. A questionnaire (face data and the Rokeach Dogmatism Scale) was sent to each agent and supervisor selected for the study. In addition, a personnel comparison booklet was sent to the supervisors in order to obtain performance ratings.

The supervisors responded one hundred percent. Of the 503 agents involved, 493 or 98 percent returned questionnaires. Four questionnaires were incomplete. Three were returned too late to be included. Thus, a total of 486 (96.6 percent of the total population) returned useable responses.

Methods of Analysis

Because the respondents were considered a unique population rather than a sample tests of significance were not used. The procedures included means and standard deviations, contingency tables, correlations and the gamma coefficients for contingency tables with ordered categories.

Means and standard deviations were computed for each of the variables for the total population, by states and by districts within states. Mean values were used in connection with the congruency phase of the study, i.e., congruency between supervisors and agents dogmatism scores.

Dogmatism and performance scores were tricotomized into low, medium and high categories. This was accomplished by examining the distribution of scores for a breaking point that would place approximately equal numbers (20-25 percent) in the low and high categories with the

bala ce in the medium category. The actual distributions of scores and percentages within each category of the variables are shown in Table I. Using these categories, the data were summarized into contingency tables for further analysis.

Table I. The distribution of scores and percentages of respondents contained in the low, medium and high categories of dogmatism and performance.

	Dogmatism		Performance	
Categories of main variables	Range of scores	%	Range of scores	%
Low	75-127	25	25-42	24
Medium	128-163	50	43-57	52
High	164-232	25	58-75	24
Total		100		100

The Pearsonian product-moment correlation coefficient was used to determine the strength and direction of relationship between variables. The correlation coefficient squared (r^2) points out the amount of variation in the dependent variable attributable to the independent variable. However, it was not anticipated that any one variable, such as dogmatism, would account for a large portion of the variance in performance; therefore, a large correlation was not expected.

With a large N (N=486), as with this study, a relatively low correlation becomes statistically significant. This does not necessarily imply an important relationship in terms of explaining variance. However, a relatively low correlation may provide a meaningful clue that a relationship exists when other factors are controlled. Meaningfulness

of a correlation coefficient with a large N, then becomes a relative judgment.

The gamma coefficient is a measure of association appropriate for contingency tables when both variables are in ordered categories. Gamma may be used to measure the association between two variables controlling for a third variable when both interval and ordinal data are available. In this study, level of education was reported as ordinal data, therefore, the gamma coefficient was used in lieu of partial correlation. Although measures of association have the same range of values (-1 to +1), a gamma coefficient cannot be compared directly with a correlation coefficient. Neither does the gamma coefficient squared indicate variance as is the case with the correlation coefficient.

Findings

Data in Table 2 show that as the level of dogmatism increased from low to high, the proportion of agents in the high performance category decreased from 30 percent to 17 percent and the proportion in the low performance category increased from 19 to 32 percent, indicating an inverse relationship. The strength of this relationship was represented by a Pearsonian product-moment correlation of -.13. Although this was not a strong relationship in terms of explaining the variance in performance attributable to dogmatism, the relationship was examined in more detail by controlling for other variables, using the gamma statistic.

The influence of age on the relationship between dogmatism and performance was examined by means of the gamma coefficient. Respondents were tricotomized with approximately equal numbers in each category. The age ranges for each category were: younger age, 24-39; medium age, 40-47;

Table 2. Distribution of respondents by dogmatism categories according to their level of performance

Performance categories	Dogmatism categories: Low No.	Low %	Medium No.	Medium %	High No.	High %
High	37	30	61	25	21	17
Medium	63	51	125	52	63	51
Low	23	19	54	23	39	32
Total	123	100	240	100	123	100

older age, 48-66 years.

The gamma coefficient between dogmatism and performance without controlling for age was -.19. As explained previously, the gamma coefficient cannot be compared directly with the correlation coefficient (r=-.13). However, the two coefficients are of similar magnitude and are consistent in revealing a negative association between the two variables under consideration.

The respondents were partitioned into the categories of dogmatism and performance controlling for age (Table 3). The computed gamma coefficients were -.16, -.36 and -.02 for the younger, medium and older age categories, respectively. This finding suggests dogmatism and performance are negatively related but are most strongly associated among the medium age category of agents. There is practically no association between dogmatism and performance among the older agents as evidenced by a gamma of -.02.

Table 3. Distribution of respondents within dogmatism categories for each category of performance, controlling for age.[a]

Performance categories[c]	Age[b] Younger: Dogmatism Low	Med.	High	Medium: Dogmatism Low	Med.	High	Older: Dogmatism Low	Med.	High
Low	7 (15)	15 (19)	5 (15)	6 (12)	16 (20)	15 (38)	10 (38)	23 (29)	19 (39)
Medium	27 (57)	49 (62)	25 (73)	23 (46)	45 (55)	18 (45)	13 (50)	31 (39)	20 (41)
High	13 (28)	15 (19)	4 (12)	21 (42)	21 (25)	7 (17)	3 (12)	25 (32)	10 (20)
	47 (100)	79 (100)	34 (100)	50 (100)	82 (100)	40 (100)	26 (100)	79 (100)	49 (100)

[a]Number in parentheses are percentages

[b]Age categories are as follows: younger 24-39 years, medium 40-47 years, older 48-66 years.

[c]The theoretical distribution is 24:52:24 for the low, medium and high performance categories, respectively.

The relationship between dogmatism and performance was also examined controlling for level of education. Respondents were dicotomized into those without a master's degree and those with a master's degree or more. (The latter category included three agents who have completed a Ph.D. degree.)

The respondents were again partitioned into categories of dogmatism and performance controlling for education as in Table 4. The gamma

coefficient was -.20 for those with less than a master's degree and -.11 for those with a master's degree or more as compared with -.19 without controlling for education. These results suggest that the association between dogmatism and performance is about twice as strong (-.20 to -.11) among those with less than a master's degree as among those with a master's degree or more. Slightly over 60 percent of the respondents have not completed a master's degree, therefore, this category contributes more to the overall gamma of -.19 when education is not controlled.

The preceding analysis reveals that age and level of education influence the relationship between dogmatism and performance. Therefore, the relationship between these variables was re-examined controlling for both age and level of education. The resulting gamma coefficients are summarized in Table 5. These data show a fairly strong negative association (-.41) between dogmatism and performance among the medium age category with less than a master's degree. About the same degree of association between dogmatism and performance is present among the younger agents without master's degrees (-.23) and medium aged agents with a master's degree (-.25). Once again there appears to be no association between these variables among the older agents regardless of level of education. The -.11 association shown previously for those with a master's degree is practically all accounted for in the medium age category.

The correlation of .11 between age and dogmatism, plus the influence of age on the relationship between dogmatism and performance prompted further analysis of the relationship between the age and dogmatism. Dogmatism now becomes the dependent variable. The gamma

Table 4. Distribution of respondents within dogmatism categories for each category of performance, controlling for level of education.[a]

Performance categories[b]	Level of education: Bachelor's degree — Dogmatism: Low	Med.	High	Level of education: Master's degree — Dogmatism: Low	Med.	High
Low	12 (21)	38 (25)	33 (37)	11 (17)	16 (18)	6 (18)
Medium	31 (54)	81 (53)	43 (48)	32 (48)	44 (51)	20 (61)
High	14 (25)	34 (22)	14 (15)	23 (35)	27 (31)	7 (21)
Total	57 (100)	153 (100)	90 (100)	66 (100)	87 (100)	33 (100)

[a]Numbers in parentheses are percentages.

[b]The theoretical percentage distribution for performance is 24:52:24 for the low, medium and high categories respectively.

coefficient for age and dogmatism was .18, indicating a low positive association between these variables.

Table 5. Gamma coefficients as measures of association between dogmatism and performance, controlling for age and level of educational attainment.

Age categories	Level of educational attainment: Less than master's degree	Master's degree or more
Low	-.23	.06
Medium	-.41	-.25
High	-.01	.00

The data in Table 6 were used to calculate gamma coefficients between age and dogmatism controlling for education. The gamma for those with less than a master's degree was .14 compared with .18 for those with a master's degree or more. These coefficients indicate very little difference in the association between age and dogmatism regardless of level of education. Stated another way, the older agents in this study tended to be slightly more dogmatic regardless of their level of education.

Since level of education showed some influence on the relationship between dogmatism and performance, the association between education and dogmatism was examined. The gamma coefficient of -.34 between level of education and dogmatism represents an inverse relationship. The relationship between these variables controlling for age yielded gamma coefficients of -.32, -.41 and -.13 for the low, medium and high age categories, respectively. Level of education and dogmatism are negatively related and are most strongly associated among the medium aged category (-.41) and least strongly associated among the older agents (-.13). Another way to interpret the gamma coefficient would be to say there is a .41 probability that two randomly selected agents in the medium age category will both show an inverse relationship between level of education and dogmatism. Whereas, among the older agents there is only a .13 probability that such will be the case.

Congruency

Rokeach et.al. suggest an association between closed-mindedness and authoritarianism. The more dogmatic person relies heavily upon authority, prefers direction from superiors and is more yielding and conforming to external pressures. The open-minded person prefers more autonomy,

Table 6. Distribution of respondents according to age within dogmatism categories, controlling for level of education.[a]

Dogmatism categories[c]	Level of education: Bachelor's degree — Age[b] Low	Med.	High	Master's degree — Age[b] Low	Med.	High
Low	23 (23)	18 (20)	16 (14)	24 (39)	32 (39)	10 (24)
Medium	50 (51)	44 (49)	59 (53)	29 (47)	38 (46)	20 (48)
High	25 (26)	28 (31)	37 (33)	9 (14)	12 (15)	12 (28)
Total	98 (100)	90 (100)	112 (100)	62 (100)	82 (100)	42 (100)

[a]Numbers in parentheses are percentages.

[b]Age categories are as follows: low 24-39 years, medium 40-47 years, and high 48-66 years.

[c]The theoretical percentage distribution for dogmatism categories is 25:50:25 for low, medium and high, respectively.

exercises creativity and initiative in solving problems and grants power to others based on cognitive accuracy rather than just on authority per se. With these and other characteristics in mind, it was hypothesized that congruency in dogmatism scores between supervisor and agent would be positively related to performance.

To test this hypothesis the supervisors and agents were dicotomized into categories designated as low dogmatism and high dogmatism. Agents were divided on the basis of population mean of 144.9. Those

below the mean were designated low dogmatics and those above the mean were designated high dogmatics. The use of the study population mean as the division point was justified on the basis that there is no one point on the dogmatism scale at which a person is declared either dogmatic or open-minded.

The supervisors' dogmatism scores ranged from 101 to 176 except for one extremely low score of 57. Two natural breaks occurred in the distribution of the supervisors scores. There were no supervisor scores between 131 and 141; however, the mean score of supervisors (136) fell within this range. Another break occurred between 142 and 151 which covered the agents mean score of 145. The latter break was chosen as the point of division for supervisors. Therefore, supervisors and agents were declared low or high in dogmatism at about the same point on the dogmatism scale. Fourteen supervisors with dogmatism scores of 142 or below were considered low in dogmatism and nine supervisors with scores of 151 or above were classified as high.

The agents dogmatism scores were then compared with their supervisors. On this basis each respondent was classified into one of the following categories:

1. high/high--supervisor and agent both high in dogmatism
2. high/low--supervisor high and agent low in dogmatism
3. low/high--supervisor low and agent high in dogmatism
4. low/low--supervisor and agent both low in dogmatism

This division provided two congruent and two incongruent categories. The distribution of respondents and the mean performance scores for each of the congruent/incongruent categories is shown in Table 7.

An examination of the performance mean scores indicates there is no association between congruency and performance. The two congruent

Table 7. The number of respondents and their performance mean scores according to supervisor/agent dogmatism congruency categories.

Supervisor/agent dogmatism congruency categories	N	Performance Mean
High-high	66	48.5
Low-low	143	51.5
High-low	105	51.1
Low-high	172	49.2
All respondents	486	50.2

categories do not have higher performance mean scores than the incongruent categories. It is interesting to note, however, that the two categories where the agents are low in dogmatism have the highest, and almost identical, mean performance scores. This suggests that agents low in dogmatism are rated higher in performance than agents high in dogmatism irregardless of supervisor/agent congruency in dogmatism. This finding further supports the negative association between dogmatism and performance.

Interpretations

The findings indicate a slight positive relationship between age and dogmatism. This relationship held true when the level of education was controlled. At least three possible interpretations can be made of this finding. The least plausible is that as people get older they become more dogmatic (closed-minded), hence a positive relationship between these variables. This interpretation is inconsistent with personality theory and the theoretical orientation of this study. Experience and

acacemic training (either formal or informal) improve conceptual development rather than inhibit it. It seems unlikely that one would regress from a highly-developed to an underdeveloped conceptual system or would become less open-minded while actively engaged in a chosen profession or vocation. It is true that individuals may become more sure of themselves or may become more rigid and less flexible in their thinking as they get older. However, closed-mindedness and rigidity are not synonomous concepts. As already pointed out, closed-mindedness is a general personality trait but rigidity is not.

> Flexibility and rigidity are not generalized personality traits. Within individuals there is considerable variability in approaching problems with flexibility or rigidity, depending upon the inherent nature and content of the problem. For example, rigidity and flexibility are fairly consistent characteristics of individuals in meeting a series of similar tasks. However, when individuals are presented varying types of problem solving tasks, they are rigid on one type but quite flexible on another.[1]

A more plausible interpretation is that the older agents scored higher than the younger agents on the dogmatism scale. This is verified by a dogmatism mean score of 150 for the older age category and 143 for the younger age category, hence a positive association between age and dogmatism. The implication of a general trend toward open-mindedness from generation to generation is consistent with personality theory. This appears to be logical trend resulting from more progressive education, improved communication and transportation facilities and other technological and scientific advancements. In general, human behavior changes rather slowly. A large change in open-mindedness would not be

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[1]Klausmeier and Goodwin, op. cit. p. 271.

expected in one generation, hence the rather slight positive association (r=.11) found in this study appears to be realistic.

Perhaps an even more plausible interpretation might be in terms of selectivity. The open-minded are characterized by a more disciplined concern for the foreseeable future. Their actions are governed by internal self actualizing forces. They perform higher and tend to seek additional education compared to the closed-minded. As a result, the open-minded have more opportunities for advancement or promotion, both within and outside the organization.

The closed-minded, on the other hand, frequently find new ideas, new situations and even new opportunities threatening. Rather than confront a new experience or new job opportunity, they will avoid them by remaining in their present position. Consequently those who are older have longer tenure, in Extension, tend to be more closed-minded and score higher on the dogmatism scale. This generalization is supported by a mean tenure in Extension of 13.6 years for the open-minded agents and 15.8 years for the closed-minded agents.

Level of education

The findings indicate a fairly strong negative association between level of educational attainment and dogmatism. The question is still unanswered as to whether increased education reduces the level of dogmatism or whether the less dogmatic seek additional education. Both viewpoints appear possible in terms of the orientation model for this study. As pointed out, education should provide for the movement of the conceptual system toward the highly developed end of the continuum. Education should provide the cognitive tools for more effective problem

solving and should help one become more open-minded--through experience in receiving, evaluating and acting upon new information as presented in an academic setting. Gray said,

> Let us first note that the inherent capacity to solve problems and think abstractly is not increased by training. No type of education can transcend the limitations of nature. Commensurate with one's intelligence, however, the ability to solve problems can be developed. Other things being equal, the better the education received, the more problem solving ability will be developed.[1]

The argument that the open-minded seek more education than the closed-minded is more strongly supported by this study. An open-minded person should find additional education (problem solving) challenging and rewarding because of his ability to form new cognitive systems and integrate them into his present level of conceptual development. Consequently, the open-minded would be expected to seek additional education.

The closed-minded, with less ability to form new conceptual systems would find additional schooling more threatening and more anxiety laden. Therefore, in situations where graduate school, for example, is voluntary, the closed-minded would tend to avoid it. Furthermore, the characteristics of the closed-minded, such as difficulty in entertaining new ideas, accepting or rejecting information on an all or none basis, and reliance upon authority are not congruent with the philosophy of graduate school programs. It seems logical that the open-minded would seek more education than would the closed-minded. This conclusion is supported by data of the study.

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[1] J. Stanley Gray, "Problem Solving," Educational Psychology, ed. C.E. Skinner (New York:Prentice Hall, 1951).

As indicated in Table 8, a higher proportion of the low dogmatics have acquired an advanced degree. Fifty-four percent of the low dogmatics have a master's degree or more as compared with 27 percent of the high dogmatics. In other words, twice as many low dogmatics have received a master's degree as high dogmatics.

Table 8. Number and percentage distribution of respondents in each dogmatism category according to level of educational attainment.

Level of ed. attainment	Dogmatism categories: Low No.	Low %	Medium No.	Medium %	High No.	High %
B.S. / 10 or less hrs.	34	28	91	38	58	47
B.S. / 11 or more hrs.	23	19	62	26	32	26
M.S. only	41	33	53	22	11	9
M.S. / 18 or less hrs.	21	17	26	11	18	15
M.S. / 19 or more hrs.	4	3	8	3	4	3
Total	123	100	240	100	123	100

Among the older agents, level of education and dogmatism were only slightly associated (gamma=-.12). The range of dogmatism scores was from 75 to 209. However, all of the respondents had completed about the same level of education, a bachelor's degree. Only 27 percent had completed a master's degree or more. In other words, they had all completed about the same level of education regardless of their level of dogmatism, hence these variables were not strongly associated.

In the medium aged category, a fairly strong association was exhibited between level of education and dogmatism (gamma=-.41). The

range of dogmatism scores for this age category was 80 to 225. Forty eight percent of this category had completed master's degrees or more. The association between education and dogmatism was not as strong for the low age category as the medium age category, but stronger than the older aged category. This can be partially explained by the relationship between age and dogmatism.

Granted, additional study is needed to determine the cause and effect relationship between education and dogmatism. The hypothesis that the open-minded tend to seek more education than the closed-minded appears to be the most acceptable interpretation at the present time.

The finding that dogmatism and performance are negatively associated is interpreted as saying that the open-minded received a higher performance rating from their supervisors than did the closed-minded. According to personalith theory, open-mindedness contributes to conceptual development and the acquisition of conceptual skills to aid in problem solving. Therefore, the open-minded are expected to perform at a higher level.

Age

The association between dogmatism and performance, controlling for age, was strongest in the medium age category (gamma=-.36). This means that among the medium aged agents the tendency for the open-minded to perform higher than the closed-minded is stronger than in the other age categories. It was previously pointed out that among the medium age category, there was a tendency for the open-minded to seek additional education. In other words, in the medium age category, the open-minded tend to ~~seek~~ have more education and ~~also~~ consequently to perform at a higher level. This

interpretation is completely congruent with the scheme in Figure 1, and points out that problem solving ability as indicated by conceptual development and measured by degree of dogmatism is related to problem solving ability as measured by performance among the medium aged respondents.

In the older age category, dogmatism and performance are not related (gamma=-.02). The open-minded do not perform higher than the closed-minded. Again the influence of education on performance is illustrated. Among the older group, all had a similar level of education, consequently education was only slightly associated with dogmatism. Therefore, performance is not influenced by level of education among the older respondents.

Age and tenure in Extension are highly correlated (r=.81). The experience gained through long years of service by the older agents tends to offset any difference in level of education. Experience has provided the skills necessary for effective problem solving irrespective of the structure of the belief system.

With respect to the younger age category, the relationship with education is again evident. Once again the open-minded perform at a higher level than the closed-minded. The open-minded also have a higher level of education. Therefore, the open-minded, with more conceptual skills is rated higher in performance than the closed-minded. However, the relationship between dogmatism and performance for the younger group is proportionately not as strong as it is for the medium aged group when the association between education and dogmatism is considered. In other words, the association between education and dogmatism is not reflected as strongly in the performance of the younger age group as it is in the

medium age category. Perhaps in the younger category inexperience is associated with the performance rating, thus offsetting some of the benefits of education, resulting in a lower association between dogmatism and performance.

It was also found that dogmatism and performance are more strongly associated among those with a lower level of educational attainment (less than a master's degree). Interpreted, this means that open-mindedness is more strongly associated with high performance among those with less education (less than a master's degree) than among those with more education. Again referring to the discussion on the association between education and dogmatism it was pointed out that the open-minded tend to seek more education than the closed-minded. This would increase the homogeneity in degree of dogmatism of those with a master's degree or more, resulting in less association between dogmatism and performance among the higher educated.

Among those with a lower level of educational attainment, open-mindedness contributes to conceptual development which in turn increases problem solving ability as reflected in higher performance ratings. Thus the degree of openness/closedness is more strongly related to performance among those with less education.

In summary, the open-minded in the young and medium age categories tend to seek additional education more than the closed-minded. The results of additional education are a more highly developed conceptual system and greater problem solving ability as reflected in a higher performance rating for the open-minded. Thus dogmatism (open/closed mindedness) is related to education, and education is related to performance rating among

the medium and younger age groups. Dogmatism and performance are not associated among the older age group regardless of level of education.

Congruency in dogmatism scores between supervisors and agents is not an important factor in the performance rating of agents. Open-minded respondents rated higher in performance than closed-minded irregardless of whether they were congruent in dogmatism with their supervisor. In other words, both open and closed minded supervisors tend to rate open-minded agents higher in performance than closed-minded.

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